JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2009, **42,** 801–805 NUMBER 4 (WINTER 2009)

OBSERVATIONAL LEARNING AND THE EMERGENCE OF SYMMETRY RELATIONS IN TEACHING SPANISH VOCABULARY WORDS TO TYPICALLY DEVELOPING CHILDREN

JOLINE RAMIREZ AND RUTH ANNE REHFELDT

SOUTHERN ILLINOIS UNIVERSITY

One 9-year-old child was taught conditional discriminations between dictated names in Spanish and their corresponding pictures across three stimulus sets while her 10-year-old brother observed. Posttests revealed the emergence of symmetry relations in the form of oral naming skills by both children.

DESCRIPTORS: observational learning, second language, symmetry relations

The stimulus equivalence paradigm has seldom been used to teach second-language skills (see Joyce, Joyce, & Wellington, 1993), although it seems to be an efficient means of teaching second-language words and phrases. Programming for the emergence of skills via observational learning might also lend itself to second-language instruction, because instruction in most educational settings is provided in a group format. MacDonald, Dixon, and LeBlanc (1986) demonstrated that symmetry relations between arbitrary line figures emerged in adults with mental retardation after the participants observed a peer being taught the baseline conditional discriminations (see also Rehfeldt, Latimore, & Stromer, 2003). The purpose of the present study was to examine the effects of an instructional protocol that arranged for the emergence of symmetry relations in the form of picture naming via observation in the context of teaching Spanish vocabulary words. If effective, such a protocol may be an economical means of teaching second-language and other academic skills.

This study constituted the master's project completed by the first author under supervision of the second author in the Behavior Analysis and Therapy program at Southern Illinois University.

Address correspondence to Ruth Anne Rehfeldt, Mailcode 4609, Rehabilitation Services Program, Rehabilitation Institute, Southern Illinois University, Carbondale, Illinois 62901 (e-mail: rehfeldt@siu.edu).

doi: 10.1901/jaba.2009.42-801

METHOD

Participants

Two typically developing siblings with no prior history of formal instruction with the Spanish language participated. Danny, who served as the observer, was a 10-year 5-month-old boy, and Wendy, who served as the learner, was a 9-year 2-month-old girl. Participants were compensated with $20 gift cards to an electronics store.

Setting and Apparatus

All sessions, which were approximately 30 min long, took place in a room (0.9 m by 1.2 m) with a desk, chair, computer monitor, and a laptop computer. During training, the observer sat in an extra chair to the left of the screen, approximately 30 cm from the learner. The experiment was programmed in Microsoft Visual Basic Studio 2005.

Experimental Design

A multiple probe design (Hanley, Heal, Tiger, & Ingvarsson, 2007; Horner & Baer, 1978) across three sets of four stimuli each was used. Both participants completed pre- and posttest probe trials with all three sets of stimuli, but only Wendy completed conditional discrimination training with the three sets.

Stimuli

Three sets of four stimuli each were included in the experiment, including animals (Set 1),

household furniture or appliances (Set 2), and clothing or jewelry items (Set 3).

Procedure

Pretests, posttests, and maintenance probes. The matching of dictated Spanish names to the corresponding picture was evaluated for both participants for all three stimulus sets (A-B relations). The participant who was not being tested was out of hearing and visual range during these test trials. Prior to pretest trials, the experimenter told each participant, ''You will hear a word and see four pictures. I want you to click the mouse once on the picture that is your choice. You may click start when you are ready.''

Testing was conducted in eight-trial blocks. The presentation of the dictated name in Spanish marked the onset of each trial and was followed half a second later by the display of four comparison stimuli evenly spaced across the center of the computer screen. The participant was required to click the computer mouse on a comparison stimulus to indicate his or her selection. The order of sample-stimulus presentations and the positioning of comparison stimuli were determined randomly, but each sample stimulus was presented twice per eight-trial block. No feedback was provided for correct or incorrect responses. Data collection was automated. Danny's criterion for exclusion was 50% accuracy or higher during the pretests for any of the stimulus sets.

The naming task (B-A symmetry relations) consisted of eight trials, with each individual stimulus being presented on the computer screen twice. Trials began when the experimenter asked the participant, ''What is this in Spanish?'' in the presence of one of the stimuli. Trials ended when the participant clicked on a button marked ''next'' to advance to the next trial. Responses were recorded on paper by the experimenter and were marked as correct if the participant articulated a word that sounded like the correct name. Native-like pronunciation was not required for a response to be scored as correct. No feedback was provided for correct or incorrect responses. Symmetry relations were inferred to be intact during pretests or to have emerged during posttests when a participant scored seven of eight correct for three consecutive eight-trial blocks.

If Wendy failed to demonstrate criterion performance on posttests for either task, she was exposed to one remedial block of conditional discrimination training. If Danny failed to demonstrate criterion performance on posttests for either task, he watched Wendy complete one additional block of conditional discrimination training.

Maintenance probes for both tasks were conducted 1 month after training.

Conditional discrimination training. Wendy was given the following instructions:

> You will hear a word and see four pictures. I want you to click the mouse once on the picture that is your choice. Do not talk to Danny or ask him for help. You may click start when you are ready.

Danny was provided with the following instructions: ''You will watch and listen as Wendy completes the task. Please pay careful attention. Please do not talk to, answer, or help Wendy. Also, do not point to the right answer.'' Wendy's training was conducted in eight-trial blocks, with each sample stimulus being presented twice per block. Training was identical to test probes for matching dictated names to pictures except that automated feedback was provided for correct and incorrect responses. Mastery criterion was seven of eight correct responses.

Interobserver Agreement and Dependent Measure

The dependent measure was the percentage of correct responses during test probes, with Danny's performance being of primary interest. Interobserver agreement was collected during the naming test because data collection was not automated during naming pretests or posttests. Iinterobserver agreement was assessed on 35%, 48%, and 43% of the test trials for Stimulus Sets 1, 2, and 3, respectively, and was calculated

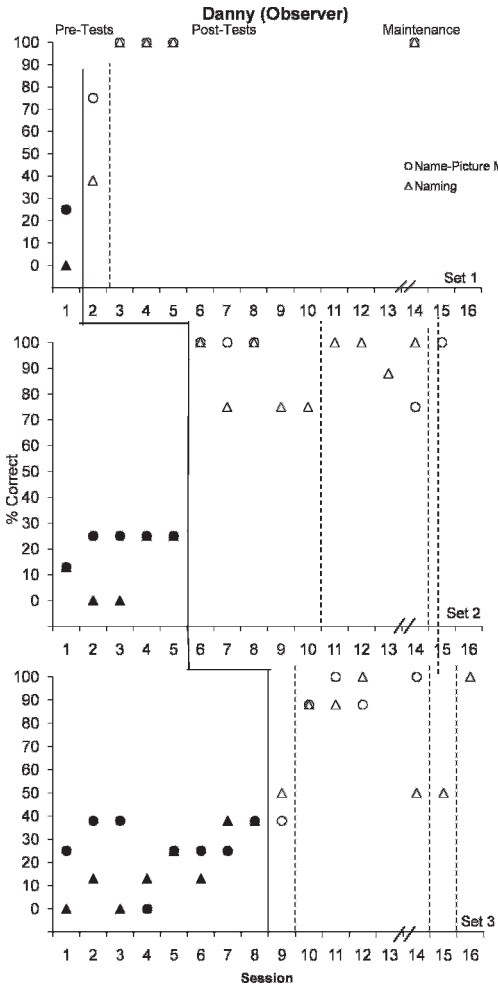

Figure 1. Percentage of Danny's correct responses on each stimulus set. Solid lines represent initial training, and dashed lines represent the observation of remedial conditional discrimination training blocks with Wendy.

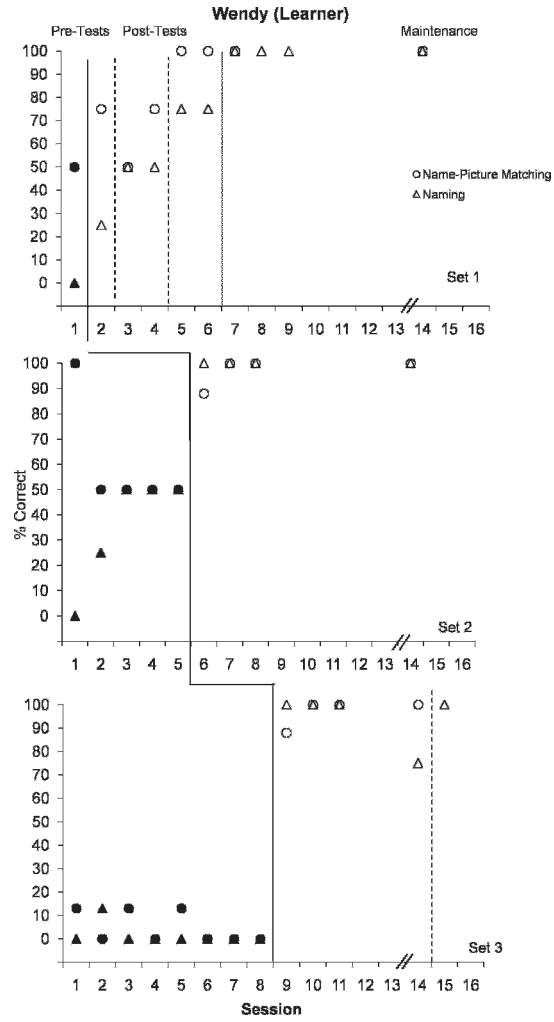

Figure 2. Percentage of Wendy's correct responses on each stimulus set. Solid lines represent initial training, and dashed lines represent the completion of remedial conditional discrimination training blocks.

by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Agreement was 100% across all sets.

RESULTS AND DISCUSSION

Figures 1 and 2 show that neither Danny nor Wendy demonstrated criterion performance on either task for any of the three stimulus sets during pretest probes. Wendy did perform with 100% accuracy on the picture identification task on her first pretest probe for Set 2, but the relations were not stable, in that performance on the task was no higher than 50% accurate on subsequent pretest probes. She mastered Stimulus Sets 1 and 2 following one training block and Set 3 following five training blocks.

Figure 1 shows that Danny did not demonstrate criterion performance on the conditional discrimination or naming tests for Set 1 during the first posttest probes following training (although his scores were substantially higher than his pretest scores). After observing Wen-

dy's first remedial training block, he demonstrated criterion performance on both tasks across three posttests. Danny's first posttest score for Set 2 was at criterion for both tasks, but his accuracy on the subsequent naming tests was variable. Danny then watched Wendy complete one training block with Set 2 and then demonstrated criterion performance on both tasks across three posttests. On Set 3, he did not immediately demonstrate criterion performance on both tasks (even though Wendy had completed five training blocks), but did so following his observation of Wendy's completion of one more training block. Thus, Danny observed one remedial training block for each stimulus set before demonstrating criterion performance on posttest probes.

Figure 2 indicates that Wendy did not demonstrate criterion performance on either test on the posttests following training of Stimulus Set 1. For this reason, one block of remedial conditional discrimination training was conducted, after which two more posttests were conducted for each task, on which she again failed to demonstrate criterion performance. Following a second block of remedial training, she met criterion performance on the conditional discrimination but not the naming task. She was then directly taught one name for one stimulus in the set, after which she named the remaining stimuli in the set across three posttests. Thus, three blocks of remedial training were conducted for Wendy following failed posttest performance for Set 1. She demonstrated mastery criterion on each training block. She demonstrated criterion performance on both tasks on the first three posttest probes for Sets 2 and 3.

Danny performed with 100% accuracy on the conditional discrimination and naming tasks for Stimulus Set 1 during maintenance probes (Figure 1). He performed with 75% accuracy on the conditional discrimination task and 100% accuracy on the naming task for Set 2, after which time he observed Wendy complete one remedial block of conditional discrimination training. He then performed with 100% accuracy on the conditional discrimination task. He performed with 100% accuracy on the conditional discrimination task and 50% accuracy on the naming task for Set 3. He then observed Wendy complete one remedial block of conditional discrimination training, after which his performance on the naming task did not improve. Following his observation of one more training block, he performed with 100% accuracy on the naming task. Thus, Danny observed one block of remedial conditional discrimination training with Wendy before he demonstrated skill maintenance on both tasks for Sets 2 and 3.

Wendy performed with 100% accuracy on both tasks for both Stimulus Sets 1 and 2 during maintenance probes, and 100% accuracy for the conditional discrimination task for Set 3, but only 75% accuracy on the naming test for Set 3 (Figure 2). One block of conditional discrimination training with Set 3 was then completed, after which she performed with 100% accuracy on the naming task for the Set 3 stimuli.

These results demonstrate that symmetry relations can emerge based on observation: Not only were the conditional discriminations that Wendy was taught acquired by Danny via observation, but the derived symmetry relations (picture naming) were found to emerge solely on the basis of observing Wendy match dictated names to pictures (see also MacDonald et al., 1986). To show the emergence of all untaught relations, Danny observed a very small number of training blocks. Thus, arranging for the observation of a peer completing conditional discrimination training may be a desirable approach to teaching basic language skills.

REFERENCES

Hanley, G. P., Heal, N. A., Tiger, J. H., & Ingvarsson, E. T. (2007). Evaluation of a classwide teaching program for developing preschool life skills. *Journal of Applied Behavior Analysis, 40*, 277–300.

Horner, R. D., & Baer, D. M. (1978). Multiple-probe technique: A variation of the multiple baseline. *Journal of Applied Behavior Analysis*, *11*, 189–196.

Joyce, B. G., Joyce, J. H., & Wellington, B. (1993). Using stimulus equivalence procedures to teach relationships between English and Spanish words. *Education and Treatment of Children*, *16*, 48–65.

MacDonald, R. P. F., Dixon, L. S., & LeBlanc, J. M. (1986). Stimulus class formation following observational learning. *Analysis and Intervention in Developmental Disabilities*, *6*, 73–87.

Rehfeldt, R. A., Latimore, D., & Stromer, R. (2003). Observational learning and the formation of classes of reading skills by individuals with autism and other developmental disabilities. *Research in Developmental Disabilities*, *24*, 333–358.

Received March 27, 2008
Final acceptance August 11, 2008
Action Editor, Chris Ninness